rotor groove **60**B. The stator **10** has a fixed connection surface **35** disposed between the front stator groove **31** and the back stator groove **38**, in which the fixed connection surface **35** connects between the front stator groove **31** and the back stator groove **38**. The front stator groove **31** and the fixed connection surface **35** and the fixed connection surface **35** and the back stator groove **38** may each be formed at an obtuse angle.

[0066] A width W**4** of the fixed connection surface **35** may have an interval equal to or larger than the width W**3** of the teeth body **21**. In an electric motor **100** having eight poles and twelve slots according to the exemplary embodiment of the present disclosure, W**4**≥W**3** may be preferable in the efficiency of the electric motor **100** and the width W**4** of the fixed connection surface **35** may be smaller than that of the teeth body **21** according to the number of slots. For example, in the electric motor having six slots, the width of the fixed connection surface **35** may be smaller than that of the teeth body **21**.

[0067] A width W**2** of the front rotor groove **60**A may have an interval larger than a width W**1** of the front stator groove **31**. The front and back stator grooves **31** and **38** may have a curvature radius equal to that of the front and back rotor grooves **60**A and **60**B.

[0068] An angle θ**5**-θ**1** between a front end of the front rotor groove **60**A and a back end of the front rotor groove **60**A is larger (θ**5**-θ**1**>θ**4**-θ**6**) than an angle θ**4**-θ**6** between a front end of the front stator groove **31** and a back end of the front stator groove **31**, based on a virtual line L that connects between a center C of the rotor and a center of the teeth part **20**. That is, the front stator groove **31** has a smaller separation distance than the front rotor groove **60**A and is received in the front rotor groove **60**A. The front rotor groove **60**A and the back rotor groove **60**B may be symmetrical to each other with respect to the bridge part **55**.

[0069] An angle θ**4** of the front end of the front stator groove **31** and the virtual line L is larger than an angle θ**2** of the front end of the fixed connection surface **35** and the virtual line L, based on the virtual line L that connects between the center of the rotor **40** and the center of the teeth part **20**. The front stator groove **31** and the back stator groove **38** may be symmetrical to each other with respect to a center of the fixed connection surface **35**.

[0070] That is, an air gap may be formed between the rotor **40** and the stator **10**. The air gap may have a first air gap part **32** formed between the rotating connection surface **65** and the fixed connection surface **35** opposing thereto and second air gap parts **33**A and **33**B that are each formed at an outside of the first air gap part **32**, e.g., at a central portion of the air gap. The second air gap parts **33**A and **33**B may be formed to have a larger interval than the first air gap part **32** by the front stator groove **31** and the front rotor groove **60**A and the back stator groove **38** and the back rotor groove **60**B.

[0071] FIG. **6** is an exemplary cross-sectional view of a second exemplary embodiment of the electric motor illustrated in FIG. **1** and FIG. **7** is an enlarged view of the stator illustrated in FIG. **6**. In FIGS. **6** and **7**, a difference from the foregoing electric motor is described but the omitted description may be replaced by the foregoing content. As illustrated in FIGS. **6** and **7**, the rotor **40** has the bridge part **55** disposed between poles. A front and a back of the bridge part **55** with respect to the rotating direction of the rotor **40** are provided with the front rotor groove **60**A and the back rotor groove **60**B that are each dented.

[0072] The stator **10** has the front stator groove **31** and the back stator groove **38** that are each dented from the inner surfaces each facing the front rotor groove **60**A and the back rotor groove **60**B. The front stator groove **31** may have first and second front stator grooves **31**A and **31**B. The first front stator groove **31**A may be disposed at the front with respect to the rotating direction of the rotor **40**. A second front stator groove **31** B may be disposed at the back of the first front stator groove **31**A and protrudes from the first front stator groove **31**A.

[0073] The back stator groove **38** may have first and second back stator grooves **38**B and **38**A. The first back stator groove **38**B is disposed at the back with respect to the rotating direction of the rotor **40**. A second back stator groove **38**A is disposed at the front of the first back stator groove **38**B and protrudes from the first back stator groove **38**B. That is, the first front stator groove **31**A and the first back stator groove **38**B and the second front stator groove **31**B and the second back stator groove **38**A may each be symmetrical to each other with respect to the virtual line L connecting between the center of the rotor **40** and the center of the teeth part **20**.

[0074] An angle θ**2** of a back end of the second front stator groove **31**B and the virtual line L may be equal to or larger than an angle θ**1** of a back end of the front rotor groove **60**A and the virtual line L, based on the virtual line L connecting between the center of the rotor **40** and the center of the teeth part **20**. An angle θ**5** of a front end of the first front stator groove **31**A and the virtual line L is larger than an angle θ**4** of the front end of the front rotor groove **60**A and the virtual line L.

[0075] The angle θ**4** of the front end of the first front rotor groove **60**A and the virtual line L is larger than an angle θ**3** of the front end of the second front stator groove **31**B and the virtual line L, in which the angle θ**3** is larger than the angle θ**2** of the back end of the second front stator groove **31**B and the virtual line L. That is, θ**1**≤θ**2**<θ**3**<θ**4**<θ**5**.

[0076] FIG. **8** is a diagram illustrating the existing electric motor. Generally, a brushless direct current motor does not include a brush and a commutator but includes an electronic commutation mechanism, such that mechanical or electrical noise may not be caused, a motor having various speeds from low speed to high speed may be manufactured, a rotating torque may be stable due to a multi pole, and a long-life electric motor may be simply manufactured.

[0077] The stator of the existing brushless direct current motor is configured to include a plurality of teeth protruding on an inner circumferential surface thereof, concave slots formed between the respective teeth, a stator core having a slot opening formed between the respective tips protruding at both ends of the teeth, and coils wound around both slots of the teeth of the stator core.

[0078] Air gaps between a stator **70** and a rotor **80** have the same interval. In this case, a deviation in magnetic density is large by a magnetic force with a permanent magnet of the rotor **80**, and therefore a cogging torque by which the rotor does not generate a uniform torque is caused, such that the motor may vibrate and thus vibration noise may be caused.

[0079] In particular, the air gap that is the interval between the rotor and the stator is preferably designed to be small. In this case, a change in reluctance is large and thus the cogging torque is increased and a torque ripple is also large, which has an adverse effect on the vibration noise.